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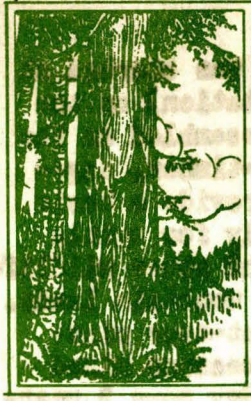

FOREST RESEARCH NOTES

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FIRST-SEASON RECORDS OF CATTLE WEIGHTS FROM A PINE-TIMBER RANGE AND A MOUNTAIN MEADOW RANGE

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Grazing grounds in the mountains of northeastern California furnish summer forage for large numbers of cattle and sheep. The most efficient utilization of this forage poses problems of concern to both the stockman and the public-land administrator. One of these problems centers around the value of forage grown in the timber compared with that grown in the meadows and flats — the subject of this report.

These summer cattle ranges consist of intermingled meadow, sagebrush, and open pine-timber types. Cattle graze principally in the meadows and surrounding sagebrush fringes from May or June until late August or early September. Only after that time do they graze very much in timber and brushy types on the adjoining mountain slopes. This tendency of cattle to graze on certain areas is influenced by many factors, including differences in tree and brush cover, forage, and topography, and the location and adequacy of livestock watering places and fences for controlling the distribution of the animals. The net result is uneven grazing of the range.

Concentration of cattle on meadows year after year is decreasing forage production and contributing to losses in soil fertility through erosion. It is estimated that on the average the grazing capacity of many unfenced meadows in northeastern California is one-half or less of former capacity. In contrast many timber-type ranges are not fully utilized. Maximum grazing values are not derived from these timber types because the forage is grazed mainly after it is mature and dry, when nutritional values are at a low level. Because of the uneven distribution of cattle on the range, therefore, valuable meadow and sagebrush grazing lands are gradually being destroyed and much forage on timber-type ranges is being wasted.

* MAINTAINED AT BERKELEY, CALIFORNIA, IN COOPERATION WITH THE UNIVERSITY OF CALIFORNIA.

Study of this problem of mountain-range management was started at the Burgess Spring Experimental Range (a branch of this Station) on the Lassen National Forest, in 1936[1]. Information is being assembled on the character, condition, grazing capacity, and value of pine-timber, sagebrush, and meadow types. This information is needed to provide a basis for determining how these types can be used most profitably for cattle grazing, with due consideration to timber growing, game and other wildlife production, recreation, and other important uses of these mountain lands. Initial studies during 1936, 1937, and 1938 showed that cut-over pine-timber range has high grazing value. During these three seasons mixed groups of beef cattle — yearling steers and heifers and dry cows 3 years old and older — grazed in a pasture containing only cut-over pine-timber range gained an average of 1½ to 2 pounds per day per head during a 100-day grazing season from June to September.

During the 1944 season, the first data on the comparative value of timber and meadow types were obtained. These initial findings are reported here.

THE EXPERIMENT

One group of 10 yearling Hereford heifers grading "medium" to "good" was grazed season-long in a 555-acre cut-over pine-timber pasture (fig.1). Another similar group of cattle was grazed in an adjoining 128-acre mountain meadow for the same period (fig.2). Grazing was started on June 2 and terminated on October 31. Care was exercised in stocking both pastures to insure an adequate supply of forage for the cattle. Thus the weight gains of the animals reflect the nutritive qualities of the forage.

Corrals and livestock scales are centrally located between the two pastures and stock water is available in each. The cattle were weighed individually to the nearest 2 pounds on a shrunk-weight basis every 2 weeks throughout the season. The cattle were held in the corrals without food or water overnight, for 15 hours, before each weighing. Measurements of plant growth and development were made at 2-week intervals to correlate forage value with cattle weights.

1/ Personnel of the Lassen National Forest, particularly P. D. Hook and P. B. Lord, and F. P. Cronemiller and associates of the Division of Range Management of the Regional Office of the Forest Service in San Francisco, participated in the planning and conduct of this experiment. During 1936, 1937, and 1938 the Cone Ranch Company, Red Bluff, managed by Roy Owens, furnished the experimental cattle. In 1944 the cattle were provided by J. I. and J. P. McClelland of Standish. T. S. Brown, farm adviser of Lassen County, and V. M. Shepard, animal husbandry specialist of the Extension Service, are giving attention to the animal husbandry phases of the experiment, involving grading to insure uniformity of experimental herds and selection for breeding and herd improvement.

Fig. 1. Experimental cattle in timber-type pasture.

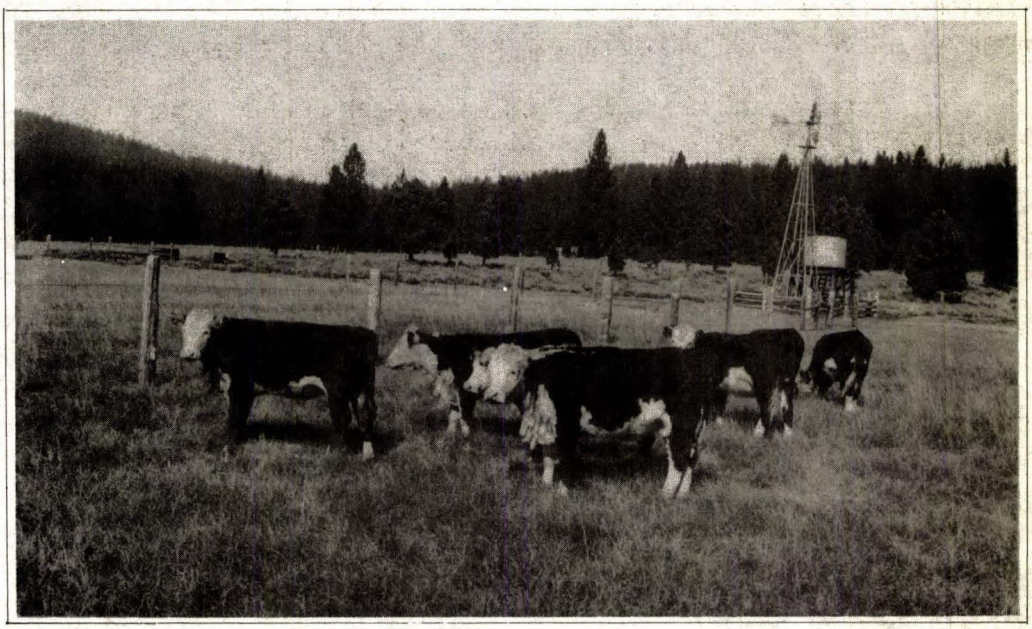

Fig. 2. Experimental cattle in mountain meadow pasture.

THE PASTURES

Ponderosa and Jeffrey pine (Pinus ponderosa and P. jeffreyi) and a few small clumps of white fir (Abies concolor) make up the tree cover in the timber pasture, which lies at a mean altitude of about 6,000 feet. In 1934, 85 percent of the timber stand of about 15,000 board feet per acre was removed in logging. The stand consisted primarily of mature and overmature trees and grew on medium to low timber-producing land.

In the timber pasture the eight most important forage species are Idaho fescue (Festuca idahoensis), spur lupine (Lupinus calcaratus), bitterbrush (Purshia tridentata), squirreltail (Sitanion hystrix), cheatgrass (Bromus tectorum), sedge (Carex rossi), needlegrass (Stipa spp.) and woolly mule-ears (Wyethia mollis). These with more than 100 other herbaceous and shrubby species form a ground cover of about 0.34 density. Big sagebrush (Artemisia tridentata) is a conspicuous element of the understory vegetation and makes up about 10 percent of the ground cover, but it is not grazed by cattle. Forage species cover about 0.24 of the ground.

The meadow pasture supports a mixture of plants averaging about 0.4 density. This relatively low density for meadow vegetation is the result of past deterioration of the plant cover. On areas that remain moist throughout most of the season, sedges and rushes (Juncus spp.), tufted hairgrass (Deschampsia caespitosa), water groundsel (Senecio hydrophilus), cinquefoil (Potentilla gracilis), and other less abundant forage species form a solid ground cover. On better-drained soils bordering these wet spots the important forage species are Nevada bluegrass (Poa nevadensis), mat muhly (Muhlenbergia squarrosa), California hairy oatgrass (Danthonia californica) and a rush (Juncus balticus). In the drier portions of the meadow, interspersed in open stands of low sagebrush (Artemisia arbuscula) and silver sagebrush (A. cana), the most important forage species are squirreltail, junegrass (Koeleria cristata), Sandbergs bluegrass (Poa secunda), shorthair sedge (Carex exserta), and Idaho fescue. In the meadow low sagebrush, buttercup (Ranunculus alismaefolius), and biscuitroot (Cogswellia spp.) are conspicuous and fairly abundant but of little value as forage.

RESULTS

The cattle grazed in the timber type gained about the same weight as the cattle grazed in the meadow and maintained weight longer in the fall (fig. 3 and table 1). The average maximum gain of the timber cattle was 214 pounds per head and of the meadow cattle 213 pounds per head. The 1-pound difference is not significant. The total gain per head made by the cattle in the timber pasture during the entire season was 205 pounds, and that made by the meadow group was only 186 pounds. Most of this difference of 19 pounds is the result of a 27-pound loss in weight of the cattle in the meadow during October, when those in the timber lost only 9 pounds. The meadow herd, however, started to gain weight about 5 or 6 days earlier and reached maximum weight 17 days earlier than the timber herd.

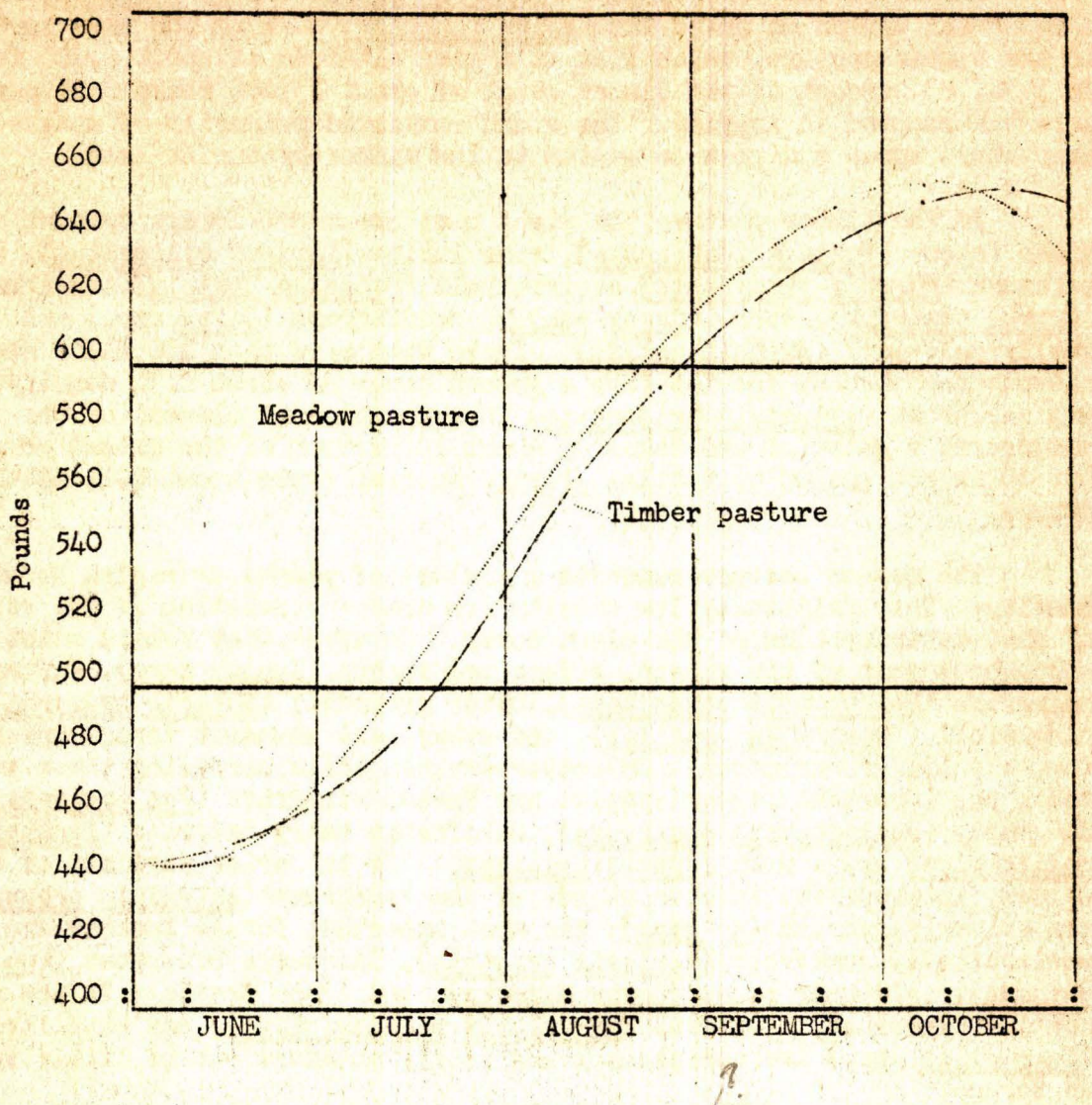

Fig. 3.- Trend in average weight per cow in each herd throughout the 1944 grazing season.

Table 1.- Cattle weights at 2-week intervals in 1944 grazing season (151 days).

Animal No.	June 2	June 16	June 30	July 14	July 28	Aug. 11	Aug. 25	Sept. 8	Sept. 22	Oct. 6	Oct. 20	Oct. 31	Weight gain: Maximum 1/	Weight gain: Total for season
	Pounds													
Animals grazed in timber pasture														
1	488	488	491	506	547	596	631	659	678	692	698	697	211	209
6	397	397	408	433	466	500	529	557	576	587	589	579	193	182
7	398	404	416	441	482	525	554	576	594	607	610	601	213	203
8	561	552	553	574	612	652	680	703	721	734	734	712	175	151
11	360	364	383	412	442	472	498	524	542	553	554	544	195	184
12	535	539	557	595	639	682	721	754	782	802	807	796	273	261
14	426	440	463	493	528	565	594	618	636	648	655	657	231	231
17	380	389	406	434	477	513	540	559	573	582	585	584	205	204
23	470	476	489	511	548	592	625	654	676	689	695	687	225	217
30	419	432	454	483	512	540	566	590	611	628	635	630	216	211
Average	443	448	462	488	525	564	594	619	639	652	656	649	214	205
Animals grazed in meadow pasture														
2	413	415	431	470	514	548	575	603	625	636	626	610	223	197
4	424	425	444	475	509	539	569	595	612	615	603	588	192	164
10	428	430	451	482	514	541	564	585	600	608	603	572	180	144
15	515	516	545	594	639	675	705	731	750	761	760	744	247	229
16	535	540	567	607	647	670	695	735	760	764	756	743	229	208
19	444	443	461	499	540	577	610	640	663	670	658	639	226	195
20	386	401	424	459	493	524	551	575	594	603	594	570	217	184
22	376	373	394	428	464	495	524	545	557	561	556	541	185	165
29	467	466	491	529	568	603	634	660	681	689	677	654	222	187
Average	443	445	468	505	543	575	603	630	649	656	648	629	213	186

1/ Gain from first weighing to greatest weight.

Table 2.- Average daily weight gain per head during 2-week periods, 1944 grazing season

Herd	June 2 to June 16	June 16 to June 30	June 30 to July 14	July 14 to July 28	July 28 to Aug. 11	Aug. 11 to Aug. 25	Aug. 25 to Sept. 8	Sept. 8 to Sept. 22	Sept. 22 to Oct. 6	Oct. 6 to Oct. 20	Oct. 20 to Oct. 31	Weight gain: Maximum 1/	Weight gain: Total for season
	Pounds												
Timber	0.3	1.0	1.9	2.6	2.7	2.2	1.8	1.4	1.0	0.3	-0.7	1.6	1.4
Meadow	0.2	1.6	2.7	2.7	2.3	2.0	1.9	1.4	0.5	-0.6	-1.7	1.7	1.2

1/ Gain from first weighing to greatest weight.

In both pastures most rapid gains were made when the forage was green, the maximum gain of 2.7 pounds per head per day in a 2-week period occurring in late July during the flowering period of the most important forage species. In table 2 the average daily gain per head is shown separately for each 2-week period between weighings. Most of the weight gains in both types were made from the time flower stalks began to show on the principal forage species until the forage was about 80 percent dry.

IMPLICATIONS OF RESULTS

These first-year results have immediate value in practical management. Perhaps the major finding was the fact that cattle gained as much weight in the timber as in the meadows. Meadow forage produced earlier gains, but timber-type forage sustained weights later in the fall. Since the latter advantage is due in large measure to the presence of browse, particularly bitterbrush, reseeding of browse on suitable sites would strengthen the nutritive qualities of autumn forage in this region.

To obtain maximum production from the range, both types should be grazed throughout most of the season. Grazing should be started after flower stalks begin to show, because cattle begin to gain weight appreciably then. The cattle should be removed from the range when they begin to lose weight — or earlier if the operator's flexibility of management permits. The indications are that more beef could be produced on the range if the cattle in the meadow were moved into the timber type during the last month of the grazing season.

The period of weight gain is related to forage growth and not to calendar dates. For example in 1944 — a very late growing season — weight gains of cattle in the timber type were made between about June 15 and October 18 and in the meadow type between June 15 and October 5. Records obtained in the timber type show that corresponding gains in previous years were made 3 or 4 weeks earlier, in the average year from late May to September 15.

The timber pasture at Burgess Spring represents some of the best timber-type range in northeastern California. The meadow pasture is about average for the area. From past and present records it is estimated that 8 acres of the timber-pasture will provide forage for one cow for 1 month. In comparison only 2 acres of the meadow pastures are required. Roughly, therefore, 4 acres of timber type range are needed to balance 1 acre of meadow. This ratio would probably increase to about 8 to 1 if the meadow were rehabilitated to potential capacity.

In most cases the timber type in this locality is producing about as much forage as the site will grow. Increased benefits, therefore, from the timber type as the result of improved management will be derived chiefly from greater and more timely use. In contrast the indications are that the quantity and quality of the forage in the meadow can be improved materially through management and artificial reseeding.

The differences in weight gains of different animals suggest the possibility of increasing production from this entire range area by better breeding and culling of the herd.

These results show that efficient use of this kind of mountain range depends upon close control over the movements and distribution of cattle. The findings again emphasize the importance of fencing range, developing additional sources of water, and paying close attention to salting, riding, and other practices which will bring about more uniform grazing of the range. The results further reveal the advantages of more timely grazing of each broad range type when its forage is most nutritious. Particularly significant are the beef-producing properties of timber forage in comparison with meadow forage. To obtain more complete information on the practical points involved, it is planned to continue the study for 2 or 3 more years.